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WEB FABRICATION LINE

- RESULTS OF A FEASIBILITY STUDY -

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ABSTRACT

In 1974 OXYTECHNIK designed a web fabrication system comprising equipment for mechanized handling and welding stiffeners to plates and a conveying system.' This first concept was the basis for a feasibility study to investigate the possibilities of highly mechanized respectively automatic fabrication of webs for building ships.

This paper will discuss this feasibility study: the history, requirements, result, description, special features, and conclusion.

1. HISTORY

In 1974 OXYTECHNIK designed a web fabrication system comprising equipment for mechanized handling and welding stiffeners to plates and a conveying system.
This first concept was the basis for a feasibility study to investigate the possibilities of highly mechanized respectively automatic fabrication of webs for building ships.

2. REQUIREMENTS

Conception:	Manufacturing of webs consisting of pre-cut plates and pre-processed stiffeners, conveying system connecting different StatiOnS.
Automation:	All major processes to be automated respectively highly mechanized as far as economical.
Dimensions of workpieces:	The line capable of handling webs and frames up to 54' length. max. plate width 13' thickness 5/16" to 1" stiffener length 1' to 13' stiffener height 18" stiffener type flat, T, L
Capacity:	Meeting the demands of AVONDALE Shipyards: 4 bulk carriers per year, 40.000 tons dead weight each.
Coating of plates and stiffeners:	Ability of handling coated materials respectively consideration of this influence on the welding speed, etc.

3. RESULT

- Flow production on two lanes with integrated processing stations including all activities necessary for a stand alone condition,

  two lanes for transport of webs and web frames,

- main station designed as robot for handling, positioning, and welding of stiffeners to the plate oriented in all directions as required,

- Maintaining exact location of plates after marking and cutting until transport to the welding station. Control of welding robot derived from data of plate marking and cutting process.

4. DESCRIPTION

(see 'layout no. 734.07351 A)

Station I

The pallets consisting of two carriages will be connected and prepared for loading of plates.

Station II

The pallets will be loaded and positioned by crane, marked and labeled. Also bevel cuts are performed here, if required All information will be transferred to the machine control from the main frame.

Station III

The pallets will be moved automatically to station III for simultaneous cutting on both lanes. All cut parts remain in their original location by leaving tabs.

Station IV

Joining of plates by welding tractors, if required.

Station V

Stiffeners will be removed automatically from a storage magazine attached to the machine, positioned at the correct location on the plate, pressed to the plate, and welded on both sides simultaneously. This robot is able to handle stiffeners of 3' to 12' length. Tacking is avoided.

Station VI

Stiffeners shorter than 3' are handled with a manually controlled positioner. Tacking and welding is done manually.

Station VII and VIII

Unloading and return of pallets.
In case of frames the pallets serve as support table for arranging, tacking, and welding face plates. To simplify this work face plate machines are provided, which hold the workpieces in the correct postion before manual tacking and welding.

Station IX

Turning over by crane, line heating, adding further stiffeners, welding of bottom sides of face plate and butt joints.

5. SPECIAL FEATURES

- The transporting system can be adapted to several. purposes. The normal use is for production of webs and frames as described. By joining pallets sidewise also panels up to 27' x 59' can be processed.

- All machines are arranged on same rails.

-Any handling of single cut plates is avoided reducing labour costs and production time.

- Cutting and marking information is utilized to control the robot.

- All mechanized stations require 7 operators. Manual work like turning over of plates, finishing of longitudinal welds, tacking, and welding of small stiffeners, etc. were not calculated.

- The capacity of the line can be increased by water plasma cutting.

- A material management and shop scheduling system may be developed to ensure a proper connection to the existent beam line, an optimum load, and a reliable availability of parts.

7. CONCLUSION

The feasibility study is a proposal based on specific requirements. Modifications easily can be made for individual needs. The robot as the heart of the line also can be used separately as a single station if a stand alone system including plate processing cannot be realized.